Lubricant composition

Technical field

The present invention relates to lubricant compositions and can be used for treatment of friction units in different machines and mechanisms in manufacturing processes, the purpose of which is modification of friction surfaces.

Background of the Invention

As a rule, different lubricant compositions on basis of technological environments with miscellaneous filling agents depending on the purpose of treatment and the material of friction pairs are used for this purpose.

It is known, that, for example, solid lubricant material with composite pattern, which is used for reinforcement of friction surfaces, decrease of wearing and friction coefficient, must have good adhesion to the surface of metal, and the lubricant film must be enough strong and long-lived, ensuring conditions for modification of surfaces. With this purpose solid lubricant material is used in composition of miscellaneous liquid technological environments, which make suspension, or in composition of pastes.

It is known that lubricant composition, which contains mineral oil and powder of metal, in which powder of cobalt with the size of particles 7-10 nm in amount of 0,08-0,12 mass. % is used [see specification statement to the patent of Russian Federation № 2028370, IC C 10 M 125/04, 18.02.92].

The described above lubricant composition provides the operating regime of friction pair without wear, using industrial or engine oil. However the proposed lubricant composition is effective only in a very narrow spacing of cobalt in suspension, at the same time the authors agree that the lubricant composition does not influence hardness because

it has low concentration of cobalt in oil. In other words, there is no modificatory-of-friction surfaces.

Antifriction paste, which contains polymer basis and well-known solid components such as disulfide of molybdenum, aluminum silicate is also known [see specification statement. to the certificate of authorship USSR № 1766950, IC C 10 M 107/30, 27.07.87]. This paste influences antifriction operating not only because it contains the mentioned solid components, but also because it woks as solid lubricant on the whole. The paste, being put with the help of a palette-knife on the surface of machine parts, becomes solid in 1,5 hours. It takes 24-36 hours to acquire indispensable hardness of the paste.

In comparison with the prototype, the property of the surface with the above-mentioned applied paste becomes better on average in 2 times. However coefficient of dry friction remains not better than 0,16-0,18, and the resource of operation is not more than 500 km.

Moreover, the use of such lubricant is inconvenient. It cannot be prepared in advance, packed and ready for the use at any moment, it cannot be used in operating conditions.

The closest to the suggested solution as it is required by engineering essence and the reached result at use, is lubricant composition, which contains lubricant oil and powder-like abrasive-like filling agent [see specification statement to the certificate of authorship USSR № 1669976, IC C 10 M125/20, 18.03.88]. The composition contains ultra dispersed carbon nitride of titan in amount of 0,01-1,5 mass. % as powder-like filling agent.

Lubricant composition, on basis of carbon nitride of titan in all the researched range of loading, reduces friction coefficient; at low temperatures the effect of decrease is observed in 4 times, and at high temperatures in 9 times. Nevertheless, the friction coefficient remains not better than 0,015 - 0,018, that finally institutes rather low level of friction surfaces endurance.

It is also necessary to mark, that fragments from 5 up to 500 nm have been utilized in the composition, that limited maximal concentration of solid component of lubricant compositions. The use of such large solid fragments in mass of the basic matter with restricted viscosity degrades sedimentation property of lubricant composition. At conservation during a short time, the composition loses its homogeneity, that degrades its service properties.

Summary of the invention

Therefore the purpose of the proposed engineering solution is the improvement of lubricant composition sedimentation properties.

The basis of the invention is the improvement of lubricant composition, in which as the consequence of the additional use of thickener and wax, the viscosity of lubricant composition sufficient for conservation of uniform distribution of solid component in lubricant composition in broad temperature range is provided; and at the expense of that, the possibility of conservation of lubricant composition in any packaging and bulks, which are usable even under operating conditions of machines and mechanisms, is reached. The lubricant composition acquires the state of gel, that is convenient to put on any friction surface, to deposit on a zone of friction of any friction units.

The problem put by is solved so that the known lubricant composition, which contains lubricant oil and powder-like abrasive-like filling agent, according to the invention, additionally contains thickener and wax in the following component ratio for mass. %

Thickener	- 10 - 12
Wax	- 20 - 25
Powder-like abrasive-like filling agent	- 20 - 25
Lubricant oil	- the rest

According to the preferred embodiment of the invention the lubricant composition contains solution of polyisobutylene rubber in lubricant oil as thickener in the following component ratio for mass. %

Polyisobutylene rubber	-	20-25
Lubricant oil	-	the rest

According to another embodiment the lubricant composition contains as filling agent fine-dispersed powder of an abrasive-like natural mineral, the dispersion ability of which does not exceed 10-30 nm.

The wax presents a matter, which is capable to form a thin lubricant film. In amount of 20-25 mass. % in the composition in combination with thickener and lubricant oil it forms gel-like warm containing mass, the viscosity of which is a little inflected at the temperature to 60° C and above, that ensures homogeneity of composition on the whole, both at continuous conservation and at use in conditions of operation loading, before effects of decrease of friction coefficient and, accordingly, decrease of temperature in friction units appear.

As it is seen from the summary of the invention, it differs from the prototype, so it is new.

The solution also has the inventive level. The composition, which presents solid lubricant on basis of stearin, oleic acid and cup grease is known [see specification statement to the certificate of authorship USSR № 1715833, IC C 10 M 117/02, 30.01.92]. This composition does not contain filling agent, which is capable to modify friction surfaces. Moreover, it is practically impossible to form gel-like mass from the enumerated components, which would be capable to form and to maintain homogeneous suspension in broad temperature range. The formed mass is either very rare or it quickly stiffens. The

presence of oleic acid in it, which is intended for stabilization of mass, decreases its consumer properties, as the latter negatively influences a living organism.

The proposed engineering solution principally differs from the known ones, as the gel-like composition on basis of organic matters executes not only lubricating functions, but also creates conditions for modification of surface by inorganic filling agent, which is exhibited first of all in the essential decrease of friction coefficient. The lubricant composition saves homogeneity at continuous (during several years) conservation.

The proposed engineering solution is industrially suitable, as the lubricant composition after preparing can be packed in suitable for use capacities and can be applied for friction units treatment of machines and mechanisms not only during their production, but also in operating conditions.

The lubricant compositions, manufactured according to the proposed engineering solution, and the results of state estimation of lubricant compositions after continuous conservation at variable temperatures, and also the results of treatment of separate friction pairs and friction units are given in the table.

The industrial oil type И – 20A was used for preparation of lubricant compositions. Polyisobutylene rubber of the mark П – 20 was used for preparation of thickener. Fine-dispersed powders manufactured from natural minerals of flaky silicates series were used as filling agent. Tribological performances were defined on exploratory cell of the friction machine MH-1M for the friction pair "disk - shoe" in 2 hours after loading. The disk was manufactured from the steel mark 20X13; the shoe was manufactured from the steel 45. The assays were conducted at constant loading 2,5 MPa. The linear speed of slip of friction surfaces was 1 m/s.

Use of the invention

The results of use of gel are given in the table. The given compositions of the lubricant compositions have industrial oil of the mark И – 20A up to 100 %.

N	Thick-ener, %	Wax, %	Filling agent, %	Period of conserv., month	Homo geneity, %	Object of assay	Friction coef.	Wear, of mcm /hour
1	10	20	0,5	1,0	100	disk/shoe	0,006-0,008	- 5-7 <
2	12	25	1,5	1,0	100	disk/shoe	0,006-0,008	- 5-7 <
3	10	20	2,5	1,0	100	bush – cr.-sh. **	0,006-0,008	+2+3 *
4	12	20	5	5,0	99,5	bush – cr.-sh	0,006-0,008	+2+3 *
5	10	25	10	12,0	98	bush - cr.-sh.	0,008-0,009	+2+3 *
6	12	20	5	12,0	98	disks / shoe	0,006-0,009	- 5-7 <
7	12	20	10	12,0	98	disks / shoe	0,006-0,009	- 5-7 <
8	10	20	2,5	6	99,5	bearing	0,006-0,009	+7+10 *
9	12	25	10	12	99,0	bearing	0,006-0,008	+7+10 *
10	10	25	20	12	98,5	bearing	0,006-0,008	+7+10 *

* to stabilization
** crank-shaft

As it is seen from the table, the lubricant composition ensures the receiving of engineering results similar to those, which solid components exhibit using fine-dispersed powder on basis of natural minerals from flaky silicates series and at the same time the sedimentation properties of lubricant composition permit its continuous conservation in broad temperature range without variation of lubrication and modification properties.